Space Weather Forecast

Issued on Tuesday, 12 September 2023 at 01:27 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate-class flares likely (R1-R2 radio blackouts). Chance of G1 Minor storms day 1 (12 Sep).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate, with three Moderate class flares observed in the last 24 hours. The slightly stronger of these was from a small sunspot in the northeast. Two further Moderate flares were observed from a small region in the southeast. This remains small and has simplified somewhat during the last 24 hours, but remains orientated in a way that increases its potential for flaring. The largest spot persists in the northwest, however this appears to have stabalised with few dynamical changes. A further modestly sized region is now approaching the north-centre disc, comprised of a number of smaller spots. Despite decreasing in overall size in the last 24 hours, this has developed a weak mixed polarity region, also increasing its flare potential. The other regions are smaller and simpler, with ten regions currently on the disc.

A CME (coronal mass ejection) was observed from the south-centre disc around 11/1400 UTC, due to the eruption of a filament (line of plasma). This is still undergoing analysis but appears to be a weak CME, heading mostly south.

Solar Wind / Geomagnetic Activity: Slow wind was observed throughout, although the wind speed did increase from background at around 350km/s to be slightly elevated at 400 km/s. The Interplanetary Magnetic Field (IMF) was mainly weak, with its north-south component also weak and variable in direction. Geomagnetic activity was Quiet (Kp 1-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) persisted at background with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be Moderate to Low, with further isolated Moderate flares likely.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs in the forecast, however the CME on 11 Sep is still under analysis. The solar wind and geomagnetic activity forecast is low confidence. This is due to the return of a coronal hole that would normally be expected to give a notable enhancement, remaining unobserved on the previous rotation of the Sun. This may increase solar winds on day 1 (12 Sep), to elevated levels. A further, weaker coronal hole sourced enhancement is also expected on day 3 (14 Sep). Consequently current Quiet geomagnetic activity is forecast to become Unsettled to Active with a chance of G1 Minor Storms day 1 (12 Sep), easing to Quiet to Unsettled day 2 (13 Sep), before increasing again day 3 (14 Sep), with a chance of Active intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to persist at background with no solar radiation storms occurring.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	5	10	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	10	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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